IN THE SPECIFICATION

Please replace the paragraph beginning at page 1, line 12, with the following rewritten paragraph:

The present invention relates to a transfer apparatus that reads a scale, provided along the whole circumference of a belt that is made to rotate, by a sensor, and detects an actual speed of the belt based on information ~~for~~ from the scale to correct a speed of the belt to a target speed according to the detected actual speed, and an image forming apparatus and a method of correcting the moving speed of the belt.

Please replace the paragraph beginning at page 2, line 14, with the following rewritten paragraph:

The one drum type of image forming apparatus has one photosensitive element, and therefore, the whole of the image forming apparatus can be comparatively downsized, and the cost can be reduced accordingly. However, the one photosensitive element is made to rotate a plurality of times (four times for a full color image) to form a ~~sheet of~~ full color image on a sheet, which makes it difficult to increase the speed of image formation.

Please replace the paragraph beginning at page 3, line 14, with the following rewritten paragraph:

In the image forming apparatus of the indirect transfer system as shown in Fig. 24, toner images formed on the photosensitive elements 91Y, 91M, 91C, and 91K are sequentially transferred superposedly to an intermediate transfer belt 94 that rotates in the direction of arrow B, and the toner images on the intermediate transfer belt 94 are collectively transferred to the sheet of paper P, by a secondary transfer device 95.

Please replace the paragraph beginning at page 5, line 15, with the following rewritten paragraph:

One of the causes of color misalignment is speed variations of the intermediate transfer belt in the case of the transfer apparatus of the indirect transfer system (sheet conveying belt in the case of the direct transfer system).

Please replace the paragraph beginning at page 7, line 5, with the following rewritten paragraph:

A transfer apparatus according to another aspect of the present invention includes a belt that rotates by the torque of a motor as a stepping motor and carries either one of a plurality of images directly and a recording material with a plurality of images, a scale is provided along at least one side of the entire circumference of an interior surface of the belt; a sensor that reads the scale on the belt to obtain scale information; an actual speed calculating unit that calculates a speed of the belt from the scale information; an abnormality detection unit that decides whether the speed of the belt detected by the actual speed calculating unit is abnormal; a control unit that provides a control to correct speed of the belt according to the speed calculated; and a motor control unit that, when the abnormality detection unit decides that the speed of the belt detected by the actual speed calculating unit is abnormal, invalidates correction of the speed of the belt by the control unit and controls the stepping motor to rotate at a predetermined target speed.

Please replace the paragraph beginning at page 8, line 5, with the following rewritten paragraph:

An image forming apparatus according to still another aspect of the present invention includes a transfer apparatus that includes a belt that rotates by torque of a motor as a

stepping motor and carries either one of a plurality of images directly and a recording material with a plurality of images, a scale is provided along at least one side of ~~entire of~~ the entire circumference of an internal surface of the belt; a sensor that reads the scale on the belt to obtain scale information; an actual speed calculating unit that calculates a speed of the belt from the scale information; an abnormality detection unit that decides whether the speed of the belt detected by the actual speed calculating unit is abnormal; a control unit that provides a control to correct speed of the belt according to the speed calculated; and a motor control unit that, when the abnormality detection unit decides that the speed of the belt detected by the actual speed calculating unit is abnormal, invalidates correction of the speed of the belt by the control unit and controls the stepping motor to rotate at a predetermined target speed.

Please replace the paragraph beginning at page 8, line 21, with the following rewritten paragraph:

A method of correcting a speed of a belt according to still another aspect of the present invention includes reading a scale on the belt to obtain scale information, the belt being rotatable and which carries either one of a plurality of images directly and a recording material with a plurality of images, a scale is provided along at least one side of a portion of the belt; calculating a speed of the belt from the scale information; calculating a speed of the belt from information other than the scale information; controlling the speed of the belt according to the speed calculated.

Please replace the paragraph beginning at page 9, line 5, with the following rewritten paragraph:

A method of correcting a speed of a belt according to still another aspect of the present invention includes reading a scale on the belt to obtain scale information, the belt

being rotated by a stepping motor and carries either one of a plurality of images directly and a recording material with a plurality of images, a scale is provided along at least one side of ~~entire of~~ the entire circumference of an internal surface of the belt; calculating a speed of the belt from the scale information; deciding whether the speed of the belt calculated from the scale information is abnormal; and controlling the speed of the belt based on the speed of the belt calculated from the scale information when it is decided at the deciding step that the speed of the belt calculated from the scale information is normal, and controlling speed of rotation of the stepping motor so as to be substantially the same as a predetermined target speed when it is decided at the deciding step that the speed of the belt calculated from the scale information is abnormal.

Please replace the paragraph beginning at page 9, line 19, with the following rewritten paragraph:

A method of correcting a speed of a belt according to still another aspect of the present invention includes reading a scale on the belt to obtain scale information, the belt being rotated by a stepping motor and carries either one of a plurality of images directly and a recording material with a plurality of images, a scale is provided along at least one side of ~~entire of the~~ entire circumference of an internal surface of the belt; calculating a speed of the belt from the scale information; calculating a speed of the belt from information other than the scale information; deciding whether the speed of the belt calculated from the scale information and the speed of the belt calculated from the information other than the scale information are abnormal; and controlling the speed of the belt based on the speed of the belt calculated from the scale information when it is decided at the deciding step that the speed of the belt calculated from the scale information is normal, controlling the speed of the belt based on the speed of the belt calculated from the information other than the scale

information when it is decided at the deciding step that the speed of the belt calculated from the scale information is abnormal, and controlling the speed of the stepping motor so as to be substantially same as a predetermined target speed when it is decided step at the deciding that the speed of the belt calculated from the scale information and the speed of the belt calculated from the information other than the scale information are abnormal.

Please replace the paragraph beginning at page 11, last line, with the following rewritten paragraph:

Fig. 13 is a flowchart of a routine of selecting a loop to be used implemented by a microcomputer included in the control device of the ~~forth~~ fourth embodiment;

Please replace the title at page 13, line 8, with the following rewritten title:

~~DETAILED DESCRIPTION~~ DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please replace the paragraph beginning at page 14, line 17, with the following rewritten paragraph:

On the other hand, a secondary transfer device 22 is provided under the transfer belt 10. The secondary transfer device 22 is realized by an endless secondary transfer belt 24 that is wound around and between two rollers 23 and 23. The secondary transfer belt 24 is pushed against the driven roller 16 through the transfer belt 10. The secondary transfer device 22 collectively transfers toner images on the transfer belt 10 to a sheet P as a recording material fed to a space between the secondary transfer belt 24 and the transfer belt 10.

Please replace the paragraph beginning at page 16, line 8, with the following rewritten paragraph:

On the other hand, pressing the start switch allows a paper feed roller 42 of a selected paper feed stage in the paper feed table 2 to rotate, a sheet P is sent out from a paper feed cassette 44 selected from a paper bank 43, and the sheet P is separated one by one by a separation roller 45 and is conveyed to a paper feed path 46.

Please replace the paragraph beginning at page 16, line 16, with the following rewritten paragraph:

When a sheet is a manually fed, the sheet P placed on the manual feed tray 51 is sent out through the rotation of a paper feed roller 50. The sheet P is separated one by one by a separation roller 52 and is conveyed to a manual feed path 53, and abuts on the registration rollers 49 to stop once.

Please replace the paragraph beginning at page 19, line 1, with the following rewritten paragraph:

The first arithmetic unit 72 also receives a signal corresponding to a target speed from a target speed setting unit 73 that sets the target speed as a basic speed of the transfer belt 10. The first arithmetic unit 72 compares the input actual speed of the transfer belt 10 with the input target speed. If the actual speed and the target speed are not the same, the first arithmetic unit 72 outputs a signal to control the number of revolutions of the belt drive motor 7 to a controller 74 so that the speed of the transfer belt 10 becomes the target speed. Then, the transfer belt 10 is made to rotate through a drive transmitting unit 14 including the drive roller 9 so that the speed becomes the target speed.

Please replace the paragraph beginning at page 21, line 17, with the following rewritten paragraph:

As shown in Fig. 6, the sensor 6 is a reflective type optical sensor including a ~~pair of~~ light emitting element 6a and a light receiving element 6b. The light emitted from the light emitting element 6a is reflected by the scale 5, and the light reflected thereby is received by the light receiving element 6b. The amount of the light reflected by slit parts 5a of the scale 5 and the amount of the light reflected by the rest 5b of the scale 5 are differently detected.

Please replace the paragraph beginning at page 22, line 2, with the following rewritten paragraph:

However, there ~~comes up~~ arises a problem here such that, for example, toner fly-off within the body 1 of the copying machine (Fig. 2) is deposited on the scale 5 as indicated by dots in Fig. 6 and the scale 5 is contaminated with time. When the scale 5 is deposited with the toner or the like (oil may be deposited during maintenance), the amount of reflected light is impossible to be accurately detected with such a scale 5 even if the scale marks are finely and accurately arranged thereon.

Please replace the paragraph beginning at page 23, line 12, with the following rewritten paragraph:

At step ~~1~~ S1, a target speed V is set for the belt drive motor 7, and the belt drive motor 7 is turned on. At step ~~2~~S2 , it is determined whether an OFF signal to turn off the belt drive motor 7 has been received. If the OFF signal has been received, the process proceeds to step ~~3~~S3 where the belt drive motor 7 is turned off, and the processing is ended. If the OFF signal has not been received, the process proceeds to step ~~4~~S4 where it is determined whether abnormalities occur in both the primary control loop R1 and the secondary control loop R2.

In other words, it is determined whether FG1=FG2=1, where FG1 is a flag indicating whether an abnormality occurs in the primary control loop R1, and 1 is set in FG1 when the abnormality occurs therein, and FG2 is a flag indicating whether an abnormality occurs in the secondary control loop R2, and 1 is set in FG2 when the abnormality occurs therein.

Please replace the paragraph beginning at page 23, last line, with the following rewritten paragraph:

If it is determined that the abnormalities occur in both the primary control loop R1 and the secondary control loop R2, i.e., Yes (Y in flowcharts), the process proceeds to step ~~5~~S5 where the belt drive motor 7 is turned off, and the processing is ended. If it is determined as No (N in flowcharts) at step 4S4, the process proceeds to step ~~6~~ S6 where the actual speed of the transfer belt 10 detected by using the primary control loop R1 is compared with the target speed V to calculate a first speed difference ΔV_1 between the actual speed and the target speed V.

Please replace the paragraph beginning at page 24, line 7, with the following rewritten paragraph:

At step ~~7~~S7, it is determined whether the first speed difference ΔV_1 is in an abnormal range or whether the first speed difference ΔV^1 is in an allowable range. If it is beyond the allowable range (e.g., it exceeds 10% with respect to the target speed), the process proceeds to step ~~10~~S10, while if it is within the allowable range, the process proceeds to step ~~8~~S8.

Please replace the paragraph beginning at page 24, line 14, with the following rewritten paragraph:

At step ~~8~~S8, a control amount to control the belt drive motor 7 is calculated so that the speed of the transfer belt 10 having the first speed difference ΔV_1 becomes the target speed V. At step ~~9~~S9, a driver is controlled according to the control amount.

Please replace the paragraph beginning at page 24, line 18, with the following rewritten paragraph:

On the other hand, if it is determined at step ~~7~~S7 that the primary control loop R1 is abnormal and the process proceeds to step ~~10~~S10, a first abnormality detected flag (hereinafter, "first flag") is set at step ~~10~~S10 (FG1=1), and the process proceeds to step ~~11~~S11. At step ~~11~~S11, only the secondary control loop R2 is used to detect an actual speed of the transfer belt 10, and the actual speed is compared with the target speed V to calculate a second speed difference ΔV_2 between the actual speed and the target speed V.

Please replace the paragraph beginning at page 25, line 1, with the following rewritten paragraph:

At step ~~12~~S12, it is determined whether the second speed difference ΔV_2 is in the abnormal range or whether the second speed difference ΔV_2 is in the allowable range. If it is beyond the allowable range (e.g., it exceeds 10% with respect to the target speed), the process proceeds to step ~~13~~S13. At step ~~13~~S13, a second abnormality detected flag (hereinafter, "second flag") is set (FG2=1), and at step ~~14~~S14, the belt drive motor 7 is turned off, and the processing is ended.

Please replace the paragraph beginning at page 25, line 8, with the following rewritten paragraph:

At step ~~12~~S12, if the second speed difference ΔV_2 is within the allowable range, the process proceeds to step ~~15~~S15. At step ~~15~~S15, only the secondary control loop R2 is used to calculate a control amount to control the belt drive motor 7 so that the speed of the transfer belt 10 having the second speed difference ΔV_2 becomes the target speed V. At step ~~16~~S16, the driver is controlled according to the control amount. The process then returns to step ~~2~~S2, and the determining and processing operations at step ~~2~~ S2 and thereafter are repeated.

Please replace the paragraph beginning at page 25, line 16, with the following rewritten paragraph:

If the OFF signal to turn off the belt drive motor 7 is received at step ~~2~~S2, the process proceeds from step ~~2~~ S2 to step ~~3~~S3, and the processing is ended.

Please replace the paragraph beginning at page 25, line 19, with the following rewritten paragraph:

If abnormalities are detected in both the primary control loop R1 and the secondary control loop R2, the process proceeds to step ~~7~~S7→ step ~~10~~S10→ step ~~11~~S11→ step ~~12~~S12→ step ~~13~~S13→ step ~~14~~S14, and the processing is ended.

Please replace the paragraph beginning at page 26, line 13, with the following rewritten paragraph:

Fig. 8 is a diagram of an example of how to determine an erroneous detection of the sensor 6 due to contamination of the belt 10.

Please replace the paragraph beginning at page 26, line 19, with the following rewritten paragraph:

A signal input from the sensor 6 (Fig. 1) is synchronized with SCLKs to generate a synchronous sensor signal. At first, it is determined how many SCLKs the sensor signal corresponds to. If the number of SCLKs is greater than a target value, then it is determined that the speed of the transfer belt 10 is slow. If it is less than the target value, then it is determined that the speed of the transfer belt 10 is fast. If the sensor 6 erroneously detects the scale 5 (Fig. 3) due to toner contamination on the scale 5, the synchronous sensor signal corresponds to twice or more of the SCLK. At this time, it is determined in the method that the belt 10 is contaminated.

Please replace the paragraph beginning at page 27, line 11, with the following rewritten paragraph:

Fig. 9 is a diagram of a transfer apparatus of an image forming apparatus that detects a speed of the transfer belt 10 from the number of revolutions of a driven roller 15 for supporting the transfer belt 10, together with a control system as shown in Fig. 1, according to a second embodiment of the present invention. Fig. 10 is a block diagram of two control loops included in the image forming apparatus.

Please replace the paragraph beginning at page 27, line 17, with the following rewritten paragraph:

The image forming apparatus according to the second embodiment is different, from the image forming apparatus of Fig. 2, only in that the moving speed of the transfer belt 10 is detected from the rotating speed of ~~a~~ the driven roller 15 that supports the transfer belt 10. Therefore, the illustration of the overall configuration of the image forming apparatus and explanation thereof are omitted, and only the difference is explained below.

Please replace the paragraph beginning at page 28, line 18, with the following rewritten paragraph:

Only one point of using the encoder 8 is different from the first embodiment. The encoder 8 detects the number of revolutions of the driven roller 15 for detection of an actual speed of the transfer belt 10 by using the tertiary control loop R3 performed from step ~~7~~ S7 to step ~~16~~ S16 in Fig. 7.

Please replace the paragraph beginning at page 28, line 23 with the following rewritten paragraph:

In other words, when the process proceeds to step ~~11~~ S11 he routine of Fig. 7, the microcomputer of the control device 70 detects the actual speed of the transfer belt 10 by using only the tertiary control loop R3. At this time, the number of revolutions of the driven roller 15 is detected by the encoder 8 as shown in Fig. 9 to detect the actual speed of the transfer belt 10.

Please replace the paragraph beginning at page 29, line 22, with the following rewritten paragraph:

Fig. 11 is a flowchart with respect to the operation of an image forming apparatus including a transfer apparatus that controls a belt speed according to a difference between an actual speed and a target speed of the belt detected respectively by the primary control loop and the secondary control loop, according to a third embodiment of the present invention.

Please replace the paragraph beginning at page 30, line 2, with the following rewritten paragraph:

The components and the control system of the transfer apparatus and the image forming apparatus of the third embodiment are the same as those explained with reference to Fig. 1 and Fig. 2. Therefore, the illustration and the explanation thereof are omitted (but Fig. 1 and Fig. 2 are referred to as required). Only the processing implemented by the microcomputer of a control device (which is configured the same as that of the control device 70) is explained. The processing is implemented following the method of correcting the moving speed of the belt 10.

Please replace the paragraph beginning at page 30, line 11, with the following rewritten paragraph:

In the microcomputer of the control device 70, if both the primary control loop R1 and the secondary control loop R2 are normally operated but a first speed difference ΔV_1 exceeds a predetermined value, the microcomputer controls the speed of the transfer belt 10 according to a combined value of the first speed difference ΔV_1 and a second speed difference ΔV_2. More specifically, the first speed difference ΔV_1 is obtained between the actual speed of the transfer belt 10 detected based on the scale 5 and a target speed thereof, and the second speed difference ΔV_2 is obtained between an actual speed of the transfer belt 10 detected by the secondary control loop R2 and the target speed of the transfer belt 10. In other words, in the third embodiment, the control device 70 functions as a control unit that corrects the speed of the transfer belt 10 according to the combined value.

Please replace the paragraph beginning at page 30, penultimate line, with the following rewritten paragraph:

The microcomputer of the control device 70 starts the routine of the processing of belt speed control as shown in Fig. 11 at a predetermined timing.

Please replace the paragraph beginning at page 31, line 2, with the following rewritten paragraph:

At step ~~21~~S21, a target speed V is set for the belt drive motor 7, and the belt drive motor 7 is turned on. At step ~~22~~S22, it is determined whether an OFF signal to turn off the belt drive motor 7 has been received. If the OFF signal has been received, the process proceeds to step ~~23~~ S23 where the belt drive motor 7 is turned off, and the processing is ended. If the OFF signal has not been received, the process proceeds to step ~~24~~ S24 where it is determined whether abnormalities occur in both the primary control loop R1 and the secondary control loop R2, that is, it is determined whether FG1=FG2=1.

Please replace the paragraph beginning at page 31, line 11, with the following rewritten paragraph:

If it is determined at step ~~24~~ ~~S24~~ that abnormalities occur therein, i.e., Yes, the process proceeds to step ~~25~~S25 where the belt drive motor 7 is turned off, and the processing is ended. If it is determined as No at step ~~24~~S24, the process proceeds to step ~~26~~S26 where an actual speed of the transfer belt 10 detected by using the primary control loop R1 is compared with the target speed V to calculate a first speed difference ΔV_1 between the actual speed and the target speed V.

Please replace the paragraph beginning at page 31, line 18, with the following rewritten paragraph:

At step ~~27~~S27, it is determined whether the first speed difference ΔV_1 is in an abnormal range or whether the first speed difference ΔV_1 is in an allowable range, for example, within 10% with respect to the target speed. If it is beyond the allowable range, the

process proceeds to step ~~30~~S30, while if it is within the allowable range, the process proceeds to step ~~28~~S28. At step ~~28~~S28, the actual speed of the transfer belt 10 detected by using the secondary control loop R2 is compared with the target speed V to calculate a second speed difference ΔV_2 between the actual speed and the target speed V.

Please replace the paragraph beginning at page 32, line 2, with the following rewritten paragraph:

At step ~~29~~S29, it is determined whether the second speed difference ΔV_2 is in the abnormal range or whether the second speed difference ΔV_2 is in the allowable range, for example, within 10% with respect to the target speed. If it is beyond the allowable range, the process proceeds to step ~~41~~S41, while if it is within the allowable range, the process proceeds to step ~~31~~S31.

Please replace the paragraph beginning at page 32, line 8, with the following rewritten paragraph:

At step ~~31~~S31, it is determined whether the first speed difference ΔV_1 exceeds a predetermined value (explained in detail later) that is set with a value within the allowable range with respect to the target speed. If it is within the predetermined value, the process proceeds to step ~~42~~S42, while if it exceeds the predetermined value, the process proceeds to step ~~32~~S32.

Please replace the paragraph beginning at page 32, line 14, with the following rewritten paragraph:

At step ~~32~~S32, a combined value ΔV of the first speed difference V_1 and the second speed difference ΔV_2 is calculated. At step ~~33~~S33, a control amount to control the belt drive

motor 7 according to the combined value ΔV is calculated so that the speed of the transfer belt 10 having the first speed difference ΔV_1 and the second speed difference ΔV_2 becomes the target speed V. At step ~~34~~S34, a driver is controlled according to the control amount.

Please replace the paragraph beginning at page 32, line 21, with the following rewritten paragraph:

On the other hand, if it is determined at step ~~27~~S27 that the first speed difference ΔV_1 is within the abnormal range, the process proceeds to step ~~30~~S30 (when the primary control loop R1 is abnormal) where the first flag is set at step ~~30~~S30 (FG1=1), and the process proceeds to step ~~35~~S35. At step ~~35~~S35, only the secondary control loop R2 is used to detect an actual speed of the transfer belt 10, and the actual speed is compared with the target speed V to calculate a second speed difference ΔV_2 between the actual speed and the target speed V.

Please replace the paragraph beginning at page 33, line 4, with the following rewritten paragraph:

At step ~~36~~S36, it is determined whether the second speed difference ΔV_2 is in the abnormal range or whether the second speed difference ΔV_2 is in the allowable range (e.g., it is within 10% with respect to the target speed). If it is beyond the allowable range, the process proceeds to step ~~37~~S37. At step ~~37~~S37, the second flag is set (FG2=1), and at step ~~38~~S38, the belt drive motor 7 is turned off, and the processing is ended.

Please replace the paragraph beginning at page 33, line 11, with the following rewritten paragraph:

At step ~~36~~S36, if the second speed difference ΔV_2 is within the allowable range, the process proceeds to step ~~39~~S39. At step ~~39~~S39, only the secondary control loop R2 is used to calculate a control amount to control the belt drive motor 7 so that the speed of the transfer belt 10 having the second speed difference ΔV_2 becomes the target speed V. At step ~~40~~S40, the driver is controlled according to the control amount. The process then returns to step ~~22~~S22, and the determining and processing operations at step ~~22~~S22 and thereafter are repeated.

Please replace the paragraph beginning at page 33, line 19, with the following rewritten paragraph:

Further, at step ~~29~~S29, if it is determined that the second speed difference ΔV_2 is in the abnormal range, then the process proceeds to step ~~41~~S41. At step ~~41~~S41, the second flag is set (FG2=1), and at step ~~42~~S42, only the primary control loop R1 is used to calculate a control amount to control the belt drive motor 7 so that the speed of the transfer belt 10 having the first speed difference ΔV_1 becomes the target speed V. At step ~~43~~S43, the driver is controlled according to the control amount. The process then returns to step ~~22~~S22, and the determining and processing operations at step ~~22~~S22 and thereafter are repeated.

Please replace the paragraph beginning at page 34, line 3, with the following rewritten paragraph:

If the OFF signal to turn off the belt drive motor 7 is received at step 22, the process proceeds from step ~~22~~S22 to step ~~23~~S23, and the processing is ended.

Please replace the paragraph beginning at page 34, line 6, with the following rewritten paragraph:

If abnormalities are detected in both the primary control loop R1 and the secondary control loop R2, the process also proceeds to step ~~27~~S27→ step ~~30~~S30→ step ~~35~~S35→ step ~~36~~S36→ step ~~37~~S37→ step ~~38~~S38, and the processing is ended.

Please replace the paragraph beginning at page 34, line 23, with the following rewritten paragraph:

Therefore, even if the scale 5 (Fig. 3) is contaminated with ~~the~~ toner or the like, the transfer belt 10 can be continuously driven at a normal moving speed unless an abnormality occurs in the secondary control loop R2.

Please replace the paragraph beginning at page 36, line 6, with the following rewritten paragraph:

In the third embodiment, only when the first speed difference ΔV_1 in the primary control loop R1 exceeds the predetermined value, the method of correcting the moving speed of the belt 10 is implemented. In other words, only in that case, the speed of the transfer belt 10 is controlled according to the combined value ΔV of the first speed difference ΔV_1 and the second speed difference ΔV_2. Accordingly, the control is performed according to the combined value ΔV, only when the accuracy of the speed control gets better in the case where the speed of the transfer belt 10 is controlled according to the combined value ΔV than the case where the speed is controlled only by the first speed difference ΔV_1.

Please replace the paragraph beginning at page 36, line 17, with the following rewritten paragraph:

Fig. 12 is a block diagram of control loops of an image forming apparatus including a transfer apparatus that has two control loops used on occurrence of an abnormality, according to a fourth embodiment of the present invention.

Please replace the paragraph beginning at page 37, line 23, with the following rewritten paragraph:

At step ~~51~~S51, it is determined whether an abnormality occurs in the primary control loop R1 using the same method as that of the embodiments. If it is determined that no abnormality occurs therein, the process proceeds to step ~~52~~S52 where a control loop to be used is selected as the primary control loop R1, and the routine is ended. If it is determined that an abnormality occurs therein, the process proceeds to step ~~53~~S53. At step ~~53~~S53, it is determined whether an abnormality occurs in the tertiary control loop R3 that detects the speed of the transfer belt 10 from the driven roller 15. As a detection portion of the speed of the transfer belt 10, the driven roller 15 is the second closest, following the primary control loop R1, to the transfer belt 10.

Please replace the paragraph beginning at page 38, line 9, with the following rewritten paragraph:

If it is determined that no abnormality occurs in the tertiary control loop R3, the process proceeds to step ~~54~~S54 where a control loop to be used is selected as the tertiary control loop R3, and the routine is ended. If it is determined that an abnormality occurs in the tertiary control loop R3, the process proceeds to step ~~55~~S55. At step ~~55~~S55, it is determined whether an abnormality occurs in the secondary control loop R2 as a control loop having a detection position of the speed that is the farthest from the transfer belt 10.

Please replace the paragraph beginning at page 38, line 17, with the following rewritten paragraph:

At step ~~55~~S55, if it is determined that no abnormality occurs in the secondary control loop R2, the process proceeds to step ~~56~~ S56 where a control loop to be used is selected as the secondary control loop R2, and the routine is ended. If it is determined that an abnormality occurs in the secondary control loop R2, the process proceeds to step ~~57~~ S57 where the belt drive motor 7 for driving the transfer belt 10 is turned off, and the routine is ended.

Please replace the paragraph beginning at page 38, line 24, with the following rewritten paragraph:

As explained above, in the fourth embodiment, the method of correcting the moving speed of the belt 10 is implemented in such a manner as follows. The three control loops R1, R2, R3 are selected in order of a control loop having a detection portion of an actual speed of the transfer belt 10 that is the closest to the transfer belt 10. Therefore, the actual speed of the transfer belt 10 can be detected by using the control loop with the highest accuracy at all times. Thus, it is possible to correct the moving speed of the belt 10 with high accuracy.

Please replace the paragraph beginning at page 39, line 7, with the following rewritten paragraph:

Fig. 14 is a flowchart of the processing of stopping correction of a belt speed implemented by a microcomputer included in a control device 70 of an image forming apparatus that includes a transfer apparatus with a belt-speed-correction stopping unit, according to a fifth embodiment of the present invention.

Please replace the paragraph beginning at page 39, line 12, with the following rewritten paragraph:

The overall configuration of the image forming apparatus according to the fifth embodiment is the same as that of Fig. 2, and therefore, the illustration thereof is omitted. The configuration of the control device 70 is the same as the control devices 70 in the embodiments of the Fig. 5, Fig. 10, and Fig. 12 although only the contents of control are different, and therefore, the illustration thereof is also omitted.

Please replace the paragraph beginning at page 39, line 19, with the following rewritten paragraph:

The microcomputer of the control device 70 according to the fifth embodiment functions also as a belt-speed-correction stopping unit. In a mode of single-color image formation, it is controlled so as to prohibit using both of the primary control loop R1 and the secondary control loop R2 (R3 of Fig. 9 is also the same).

Please replace the paragraph beginning at page 39, penultimate line, with the following rewritten paragraph:

The microcomputer starts the processing of stopping belt speed correction as shown in Fig. 14 at a predetermined timing. At step ~~61~~S61, it is determined whether a mode of formation of only a single color image (including any other color than black) has been selected. If it is determined as No, that is, if a mode of formation of color images has been selected, the process proceeds to step ~~62~~S62 where a subroutine is executed, and the subroutine is ended. The subroutine is the processing of belt speed correction by using the primary control loop R1 and the secondary control loop R2.

Please replace the paragraph beginning at page 40, line 8, with the following rewritten paragraph:

Further, at step ~~61~~S61, if the mode of formation of a single color image has been selected, the process proceeds to step ~~63~~ S63 where it is controlled so as to prohibit the belt speed correction using the primary control loop R1 and the secondary control loop R2, and the subroutine is ended.

Please replace the paragraph beginning at page 40, line 13, with the following rewritten paragraph:

In the fifth embodiment, when the mode of formation of a single color image is selected, the belt speed correction using the primary control loop R1 and the secondary control loop R2 is not executed. Therefore, it is possible to reduce a time required for starting first image formation (first copy) accordingly.

Please replace the paragraph beginning at page 42, penultimate line, with the following rewritten paragraph:

Fig. 16 is a block diagram of a control system relating to the control of belt speed correction of an image forming apparatus that detects the speed of the transfer belt 10 from the number of revolutions of a driven roller 15 for supporting the transfer belt 10 that is driven by the stepping motor 11, according to a seventh embodiment of the present invention. It is noted that the same reference numerals are assigned to those corresponding to the components in Fig. 15.

Please replace the paragraph beginning at page 44, line 11, with the following rewritten paragraph:

The microcomputer of the control device 70 starts the routine. At step ~~71~~S71, a target speed V is set for the stepping motor 11, and the stepping motor 11 is turned on. At step ~~72~~S72, it is determined whether an OFF signal to turn off the stepping motor 11 has been received. If the OFF signal has been received, the process proceeds to step ~~90~~ S90 where the stepping motor 11 is turned off, and the processing is ended. If the OFF signal has not been received, the process proceeds to step ~~73~~S73 where it is determined whether abnormalities occur in both the primary control loop R1 and the tertiary control loop R3, that is, it is determined whether FG1=FG3=1.

Please replace the paragraph beginning at page 44, line 21, with the following rewritten paragraph:

If it is determined that the abnormalities occur therein, i.e., Yes, the process proceeds to step ~~74~~S74 where a target speed value for rotating the stepping motor 11 is fixed. At step ~~75~~S75, the driver is controlled so as to rotate the stepping motor 11 at the fixed target speed value, and the process returns again to step ~~72~~S72.

Please replace the paragraph beginning at page 45, line 1, with the following rewritten paragraph:

If it is determined as No at step ~~73~~S73, the process proceeds to step ~~76~~S76 where the actual speed of the transfer belt 10 detected by using the primary control loop R1 is compared with the target speed V to calculate a first speed difference ΔV_1 between the actual speed and the target speed V.

Please replace the paragraph beginning at page 45, line 6, with the following rewritten paragraph:

At step ~~77~~S77, it is determined whether the first speed difference ΔV_1 is in an abnormal range or whether the first speed difference ΔV_1 is in an allowable range. If it is beyond the allowable range, the process proceeds to step ~~80~~S80, while if it is within the allowable range, the process proceeds to step ~~78~~S78. At step ~~78~~S78, a control amount to control the stepping motor 11 is calculated so that the speed of the transfer belt 10 having the first speed difference ΔV_1 becomes the target speed V. At step ~~79~~S79, a driver is controlled according to the control amount.

Please replace the paragraph beginning at page 45, line 14, with the following rewritten paragraph:

On the other hand, if it is determined at step ~~77~~S77 that the primary control loop R1 is abnormal, the process proceeds to step ~~80~~S80 where the first flag is set (FG1=1), and the process proceeds to step ~~81~~S81. At step ~~81~~S81, only the tertiary control loop R3 is used to detect an actual speed of the transfer belt 10, and the actual speed is compared with the target speed V to calculate a second speed difference ΔV_2 between the actual speed and the target speed.

Please replace the paragraph beginning at page 45, line 21, with the following rewritten paragraph:

At step ~~82~~S82, it is determined whether the second speed difference ΔV_2 is in the abnormal range or whether the second speed difference ΔV_2 is in the allowable range. If it is beyond the allowable range (e.g., it exceeds 10% with respect to the target speed), the process proceeds to step ~~83~~S83. At step ~~83~~S83, a third abnormality detected flag (hereinafter, "third flag") indicating that an abnormality occurs in the tertiary control loop R3 is set (FG3=1), and the process returns again to step ~~72~~S72.

Please replace the paragraph beginning at page 46, line 3, with the following rewritten paragraph:

At step ~~82~~S82, if the second speed difference ΔV_2 is within the allowable range, the process proceeds to step ~~84~~S84. At step ~~84~~S84, only the tertiary control loop R3 is used to calculate a control amount to control the stepping motor 11 so that the speed of the transfer belt 10 having the second speed difference ΔV_2 becomes the target speed V. At step ~~85~~S85, the driver is controlled according to the control amount. The process then returns to step 72, and the determining and processing operations at step ~~72~~S72 and thereafter are repeated.

Please replace the paragraph beginning at page 46, line 11, with the following rewritten paragraph:

If the OFF signal to turn off the stepping motor 11 is received at step ~~72~~S72, the process proceeds from step ~~72~~S72 to step ~~90~~ S90, and the processing is ended.

Please replace the paragraph beginning at page 46, line 14, with the following rewritten paragraph:

If abnormalities are detected in both the primary control loop R1 and the tertiary control loop R3, the process proceeds to step ~~77~~S77→ step ~~80~~S80→ step ~~81~~S81→ step ~~82~~S82→ step ~~83~~S83→ step ~~72~~S72→ step ~~73~~S73→ step ~~74~~S74→ step ~~75~~S75, and the speed of the transfer belt 10 is controlled by rotating the stepping motor 11 at the target speed value without stopping the stepping motor 11.

Please replace the paragraph beginning at page 46, line 14, with the following rewritten paragraph:

As explained above, in the seventh embodiment, the tertiary control loop R3 is used only when an abnormality occurs in the primary control loop R1. Therefore, when the primary control loop R1 is normally operated, the method of correcting the moving speed of the belt 10 is implemented in such a manner as follows. The speed of the transfer belt 10 is corrected according to only the difference between the actual speed of the transfer belt 10 detected based on the scale 5 and the target speed thereof. During its normal operation, the moving speed of the transfer belt 10 is directly detected by the sensor 6 in the primary control loop R1. It is thereby possible to obtain a feedback signal with the highest accuracy, thus, correcting the moving speed of the belt with high accuracy.

Please replace the paragraph beginning at page 47, line 7, with the following rewritten paragraph:

Fig. 18 is a flowchart of an image forming apparatus including a transfer apparatus according to an eighth embodiment of the present invention. The transfer apparatus controls a belt speed by rotation of the stepping motor 11 according to each difference between an actual speed and a target speed of the transfer belt detected respectively by the primary control loop R1 and the tertiary control loop R3.

Please replace the paragraph beginning at page 48, line 14, with the following rewritten paragraph:

At step ~~91~~S91, a target speed V is set for the stepping motor 11, and the stepping motor 11 is turned on. At step ~~92~~S92, it is determined whether an OFF signal to turn off the stepping motor 11 has been received. If the OFF signal has been received, the process proceeds to step ~~108~~S108 where the stepping motor 11 is turned off, and the processing is ended. If the OFF signal has not been received, the process proceeds to step ~~93~~S93 where it

is determined whether abnormalities occur in both the primary control loop R1 and the tertiary control loop R3, that is, it is determined whether FG1=FG3=1.

Please replace the paragraph beginning at page 48, line 23, with the following rewritten paragraph:

If it is determined that the abnormalities occur therein, i.e., Yes, the process proceeds to step ~~94~~ S94where a target speed value for rotating the stepping motor 11 is fixed. At step ~~95~~S95, the driver is controlled so as to rotate the stepping motor 11 at the fixed target speed value, and the process returns again to step ~~92~~S92.

Please replace the paragraph beginning at page 49, line 3, with the following rewritten paragraph:

If it is determined as No at step ~~93~~S93, the process proceeds to step ~~96~~S96 where the actual speed of the transfer belt 10 detected by using the primary control loop R1 is compared with the target speed V to calculate a first speed difference ΔV_1 between the actual speed and the target speed V.

Please replace the paragraph beginning at page 49, line 8, with the following rewritten paragraph:

At step S97 ~~97~~, it is determined whether the first speed difference ΔV_1 is in an abnormal range or whether the first speed difference ΔV_1 is in an allowable range, for example, within 10% with respect to the target speed. If it is beyond the allowable range, the process proceeds to step 100, while if it is within the allowable range, the process proceeds to step ~~98~~S98. At step ~~98~~S98, the actual speed of the transfer belt 10 detected by using the

tertiary control loop R3 is compared with the target speed V to calculate a second speed difference ΔV_2 between the actual speed and the target speed V.

Please replace the paragraph beginning at page 49, line 17, with the following rewritten paragraph:

At step ~~99~~S99, it is determined whether the second speed difference ΔV_2 is in the abnormal range or whether the second speed difference ΔV_2 is in the allowable range, for example, within 10% with respect to the target speed. If it is beyond the allowable range, the process proceeds to step ~~111~~S11, while if it is within the allowable range, the process proceeds to step ~~101~~S101.

Please replace the paragraph beginning at page 49, line 23, with the following rewritten paragraph:

At step S101 ~~101~~, it is determined whether the first speed difference ΔV_1 exceeds a predetermined value (setting is the same as that of Fig. 1) that is set with a value within the allowable range with respect to the target speed. If it is within the predetermined value, the process proceeds to step ~~112~~S112, while if it exceeds the predetermined value, the process proceeds to step ~~102~~S102.

Please replace the paragraph beginning at page 50, line 4, with the following rewritten paragraph:

At step ~~102~~S102, a combined value ΔV of the first speed difference ΔV_1 and the second speed difference ΔV_2 is calculated. At step ~~103~~S103, a control amount to control the stepping motor 11 according to the combined value ΔV is calculated so that the speed of the transfer belt 10 having the first speed difference ΔV_1 and the second speed difference ΔV_2

becomes the target speed V. At step ~~104~~S104, a driver is controlled according to the control amount.

Please replace the paragraph beginning at page 50, line 11, with the following rewritten paragraph:

On the other hand, if it is determined at step ~~97~~S97 that the first speed difference ΔV_1 is within the abnormal range, the process proceeds to step ~~100~~S100 (when the primary control loop R1 is abnormal) where the first flag is set (FG1=1), and the process proceeds to step ~~105~~S105. At step ~~105~~S105, only the tertiary control loop R3 is used to detect an actual speed of the transfer belt 10, and the actual speed is compared with the target speed V to calculate a second speed difference ΔV_2 between the actual speed and the target speed V.

Please replace the paragraph beginning at page 50, line 19, with the following rewritten paragraph:

At step ~~106~~S106, it is determined whether the second speed difference ΔV_2 is in the abnormal range or whether the second speed difference ΔV_2 is in the allowable range (e.g., it is within 10% with respect to the target speed). If it is beyond the allowable range, the process proceeds to step ~~107~~S107. At step ~~107~~S107, the third flag is set (FG3=1), and the process proceeds from step ~~92~~S92 to step ~~108~~S108. At step ~~108~~S108, the stepping motor 11 is turned off, and the processing is ended.

Please replace the paragraph beginning at page 51, line 1, with the following rewritten paragraph:

At step ~~106~~S106, if the second speed difference ΔV_2 is within the allowable range, the process proceeds to step ~~109~~S109. At step ~~109~~S109, only the tertiary control loop R3 is used

to calculate a control amount to control the stepping motor 11 so that the speed of the transfer belt 10 having the second speed difference ΔV_2 becomes the target speed V. At step ~~110~~S110, the driver is controlled according to the control amount. The process then returns to step ~~92~~S92, and the determining and processing operations at step ~~92~~S92 and thereafter are repeated.

Please replace the paragraph beginning at page 51, line 9, with the following rewritten paragraph:

Further, at step ~~99~~S99, if it is determined that the second speed difference ΔV_2 is in the abnormal range, the process proceeds to step ~~111~~S111 where the third flag is set (FG3=1). At step ~~112~~S112, only the primary control loop R1 is used to calculate a control amount to control the stepping motor 11 so that the speed of the transfer belt 10 having the first speed difference ΔV_1 becomes the target speed V. At step ~~113~~S113, the driver is controlled according to the control amount. The process then returns to step ~~92~~S92, and the determining and processing operations at step ~~92~~S92 and thereafter are repeated.

Please replace the paragraph beginning at page 51, line 18, with the following rewritten paragraph:

If the OFF signal to turn off the stepping motor 11 is received at step ~~92~~S92, the process proceeds from step ~~92~~S92 to step ~~108~~S108 where the stepping motor 11 is stopped, and the processing is ended.

Please replace the paragraph beginning at page 51, line 21, with the following rewritten paragraph:

If abnormalities are detected in both the primary control loop R1 and the tertiary control loop R3, the process proceeds to step ~~97~~S97→ step ~~100~~S100→ step ~~105~~S105→ step ~~106~~S106→ step ~~107~~S107→ step ~~92~~S92→ step ~~93~~S93→ step ~~94~~S94→ step ~~95~~S95, and the speed of the transfer belt 10 is controlled by rotating the stepping motor 11 at the target speed value without stopping the stepping motor 11.

Please replace the paragraph beginning at page 53, line 17, with the following rewritten paragraph:

At step ~~121~~S121, it is determined whether an abnormality occurs in the primary control loop R1 using the same method as that with reference to Fig. 13. If it is determined that no abnormality occurs therein, the process proceeds to step ~~122~~ S122 where a control loop to be used is selected as the primary control loop R1, and the routine is ended. If it is determined that an abnormality occurs therein, the process proceeds to step ~~123~~S123. At step ~~123~~S123, it is determined whether an abnormality occurs in the tertiary control loop R3 that detects the speed of the transfer belt 10 from the driven roller 15. As the detection portion for the speed of the transfer belt 10, the driven roller 15 is the second closest, following the primary control loop R1, to the transfer belt 10.

Please replace the paragraph beginning at page 54, line 4, with the following rewritten paragraph:

At step ~~123~~S123, if it is determined that no abnormality occurs in the tertiary control loop R3, the process proceeds to step ~~124~~S124 where a control loop to be used is selected as the tertiary control loop R3, and the routine is ended. If it is determined that an abnormality occurs in the tertiary control loop R3, the process proceeds to step ~~125~~S125. At step

~~125~~S125, it is determined whether an abnormality occurs in the secondary control loop R2 as a control loop having a speed detection position that is the farthest from the transfer belt 10.

Please replace the paragraph beginning at page 54, line 12, with the following rewritten paragraph:

At step ~~125~~S125, if it is determined that no abnormality occurs in the secondary control loop R2, the process proceeds to step ~~126~~S126 where a control loop to be used is selected as the secondary control loop R2, and the routine is ended. If it is determined that an abnormality occurs in the secondary control loop R2, the process proceeds to step ~~127~~S127 where the stepping motor 11 is made to rotate at the target speed value, and the routine is ended.

Please replace the paragraph beginning at page 54, line 19, with the following rewritten paragraph:

As explained above, in the ninth embodiment, the method of correcting the moving speed of the belt 10 is implemented in such a manner as follows. The three control loops R1, R2, R3 are selected in order of a control loop having a detection portion of an actual speed of the transfer belt 10 that is the closest to the transfer belt 10. Therefore, the actual speed of the transfer belt 10 can be detected by using the control loop with the highest accuracy under the normal situation. Thus, it is possible to correct the moving speed of the belt 10 with high accuracy.

Please replace the paragraph beginning at page 55, line 8, with the following rewritten paragraph:

If the microcomputer performs the processing of stopping belt speed correction explained referring to Fig. 14, there is no need to perform the belt speed correction using the primary control loop <u>10</u> and the secondary and <u>the</u> tertiary control loops <u>R2</u> in the mode of formation of a single color image. Therefore, it is possible to reduce a time required for starting first image formation (first copy) accordingly.

Please replace the paragraph beginning at page 55, line 22, with the following rewritten paragraph:

However, the speed control of the belt <u>10</u> using the secondary and tertiary control loops R2 and R3 and the control of rotating the stepping motor 11 at only the target speed value are performed as a secondary operation of the primary control loop R1. Therefore, the moving speed of the transfer belt 10 is not directly feedback-controlled, and it is therefore difficult to keep the moving speed of the belt <u>10</u> highly accurate.

Please replace the paragraph beginning at page 56, line 22, with the following rewritten paragraph:

If the control device 70 (or control device 80) has a function as means of displaying occurrence of abnormality in the primary control loop <u>R1</u>, the operator recognizes at once that the abnormality has occurred in the primary control loop R1 from the notice on the display unit 13.

Please replace the paragraph beginning at page 57, line 1, with the following rewritten paragraph:

As explained above, the embodiments of the present invention that is applied to the indirect transfer system of transfer apparatus and image forming apparatus and is also applied

to the method of correcting the moving speed of the belt 10 using the indirect transfer system are explained. The present invention is also applicable to the method of correcting the moving speed of the belt 10 in the direct transfer system using the sheet conveying belt as explained with reference to Fig. 22.

Please replace the paragraph beginning at page 57, line 8, with the following rewritten paragraph:

In the transfer apparatuses and the image forming apparatuses according to the embodiments, the example of providing the sensor 6 in the vicinity of the driven roller 15 is explained. However, the sensor 2301 may be provided at any other position on the belt 10, for example, a position between the driven roller 16 and the driven roller 15, and the encoder 2302 may be provided to the driven roller 16 as shown in Fig. 23.

Please replace the paragraph beginning at page 57, line 14, with the following rewritten paragraph:

Fig. 23 is a diagram of an example of an image forming apparatus in which a sensor 2301 is provided at a position on the belt 10 between the driven roller 16 and the driven roller 15 and an encoder 2302 is fixed to the driven roller 16. The speed of the belt 10 is controlled in the same manner as that of the first embodiment.

Please replace the paragraph beginning at page 57, line 19, with the following rewritten paragraph:

As explained above, according to one aspect of the present invention, when an abnormality occurs in the primary control loop R1 that detects an actual speed of the transfer belt 10 by reading the scale 5 on the transfer belt 10 by the sensor 6, the secondary control

loop R2 that does not use the scale 5 and the sensor 6 is used to correct the speed of the transfer belt 10. Therefore, even if the speed of the transfer belt cannot accurately be detected by the primary control loop R1 due to toner contamination on the scale, or the like, the secondary control loop R2 that does not use the scale 5 and the sensor 6 is used to correct the speed of the transfer belt 10. Thus, even if full color images are directly transferred to the transfer belt 10 or transferred thereto through a recording material so as to be superposed on one another, a high-quality color image free from color misalignment and change in hue is obtained.

Please replace the paragraph beginning at page 58, line 8, with the following rewritten paragraph:

According to another aspect of the present invention, when an abnormality occurs in the primary control loop R1, the stepping motor is made to rotate at the target speed value to control the speed of the transfer belt 10. Therefore, although the present invention has a simple and low-cost configuration, it is possible to drive continuously the transfer belt 10 even if an abnormality occurs in the primary control loop E1 due to toner contamination on the scale 5 or the like. Thus, it is possible to make the color misalignment and the change in hue on the transferred image almost unnoticeable.

Please replace the Abstract paragraph beginning at page 74, line 2, with the following rewritten paragraph: